

MARCONI

ATLANTIC OCEAN

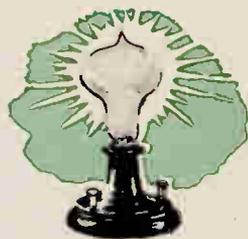
St. Johns

NEW
FOUND
LAND



PICTURE CALENDAR OF MARCONI AND HIS TIMES

- 1874** GUGLIELMO MARCONI WAS BORN IN ITALY
Disraeli was the prime minister of Great Britain.
Victor Emmanuel II was the first king of a united Italy.
The International Postal Convention in Switzerland established an international postal service, which is the foundation of the one in use at the present time.
Three years earlier Chicago was destroyed by fire (1871).
One year earlier David Livingstone, explorer of Africa, died (1873).
Five years later Thomas A. Edison invented the incandescent electric light (1879).



- 1895** MARCONI INVENTED WIRELESS
Six years earlier Jane Addams opened Hull House (1889).
Five years earlier Wilhelmina became queen of the Netherlands (1890).
Florence Nightingale, great hospital reformer, was living in retirement in England.



- 1901** MARCONI BRIDGED THE ATLANTIC WITH WIRELESS
Five years earlier the rich Klondike gold fields were discovered in northwestern Canada (1896).
Three years earlier the Spanish-American War was fought in Cuba (1898).
One year earlier the Territory of Hawaii was established (1900).
Theodore Roosevelt became President of the United States.
The Boxer Rebellion in China came to an end.



- 1909** MARCONI RECEIVED THE NOBEL PRIZE FOR PHYSICS
Louis Blériot was the first to cross the English Channel in an airplane.
One year later George V became the ruler of Great Britain (1910).
Two years later Amundsen discovered the South Pole (1911).
Three years later Arizona became the forty-eighth state in the United States (1912).
Five years later the first vessel passed through the Panama Canal (1914).

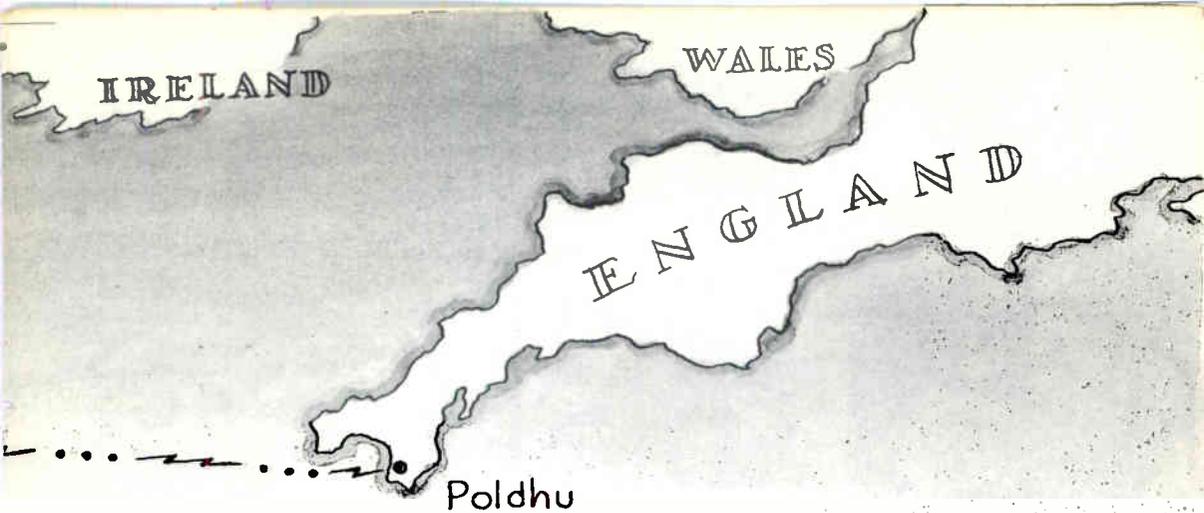


- 1937** MARCONI DIED IN ITALY
Franklin Delano Roosevelt was President of the United States.
Mohandas Gandhi was working to gain the independence of India.
Many new social reforms were started in Colombia, Ecuador, Uruguay, and Venezuela.
World War II began two years later (1939).





REAL PEOPLE



REAL PEOPLE

MARCONI

By JOSEPH COTTLER

Illustrated by MANNING DE V. LEE

FRANCES CAVANAH, *Director of Biographies*



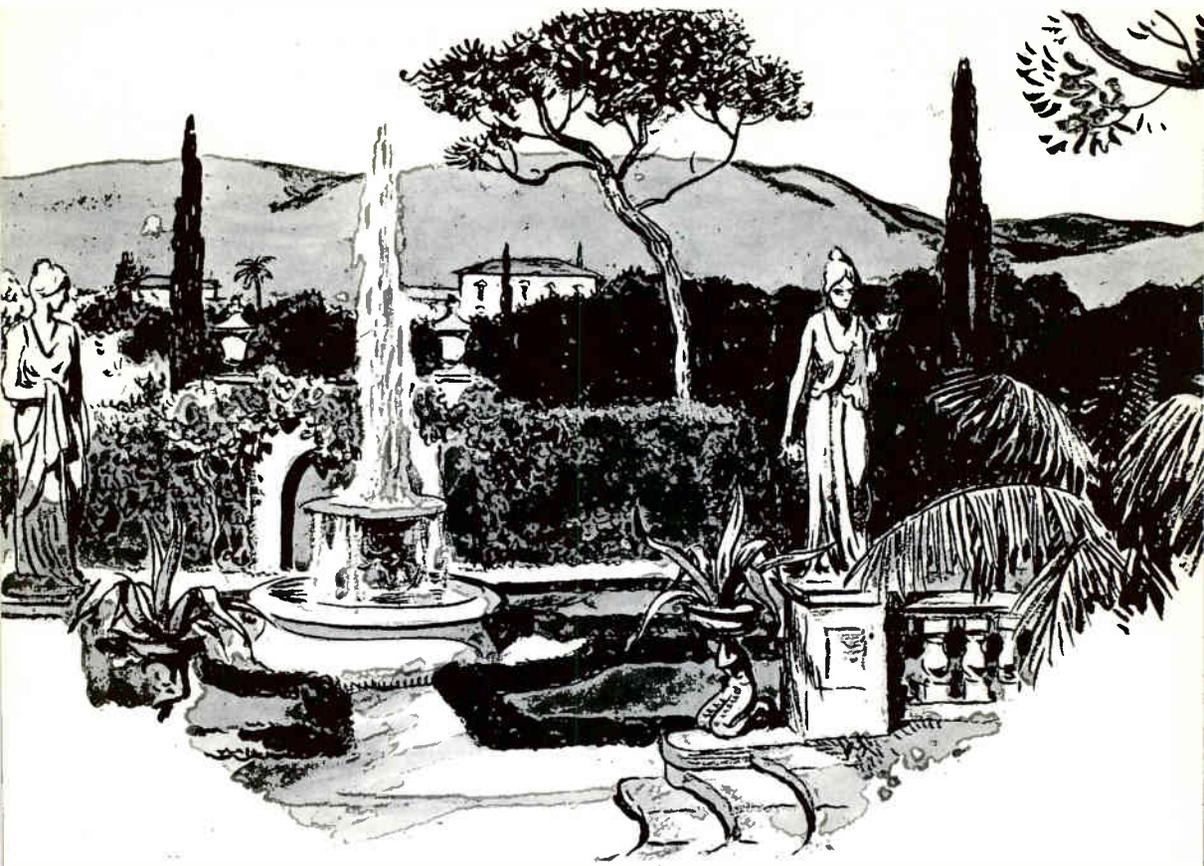
CALIFORNIA STATE SERIES

Published by

CALIFORNIA STATE DEPARTMENT OF EDUCATION

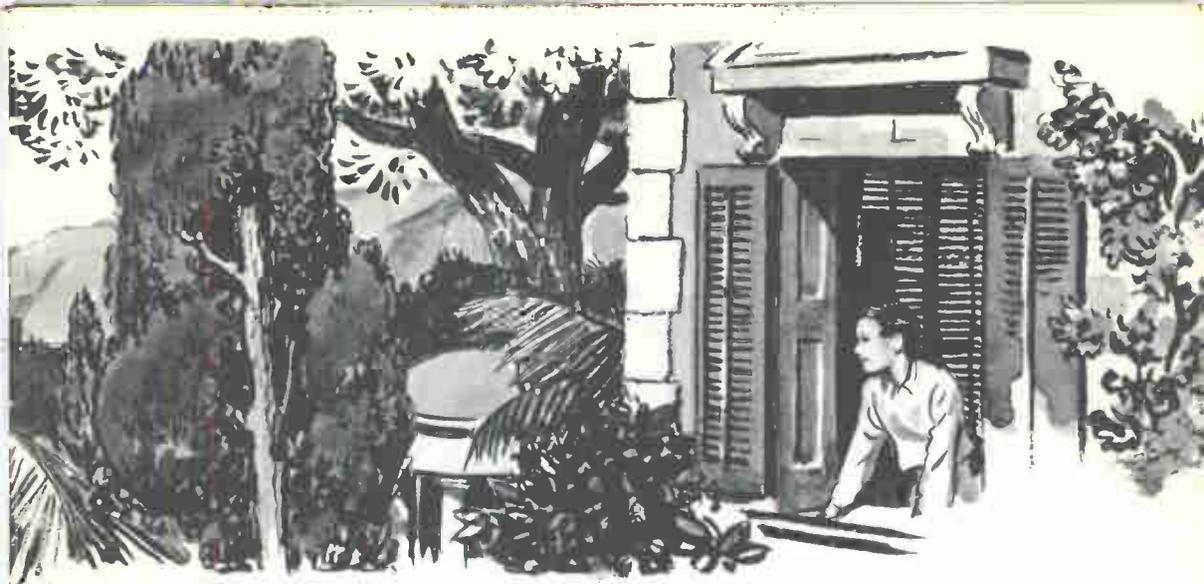
SACRAMENTO, 1956

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Printed in U.S.A. 4828



A Spark of an Idea

A stairway in the boy's room led up to the top story of the house. There he could escape the voices of his family and listen to the fountain singing in the garden below. With luck he might even see a rainbow in the misty spray. Beyond the garden the land sloped down into a valley, then climbed upward again. The boy, Guglielmo (*goo-yel' mo*) Marconi, couldn't see what lay beyond. He knew, however, that there was a range of mountains called the Apennines (*ap' eh-nines*). He imagined tumbling streams, too, where a fellow might hide away for an afternoon with a book.



His mother smiled at her quiet son. "And what did you do this afternoon, dear?" she asked.

"Nothing much. I was reading."

"Was it a good story?"

"It wasn't a story."

"What was it?"

Guglielmo hesitated. "Well, it was about electricity."

"What about it?" demanded Alfonso, his older brother.

Guglielmo had amazing things to tell of what he had read. His voice became eager, and his blue eyes opened wide. "I read that if you rub a glass rod with a flannel cloth, it becomes a magnet. You can point the rod at bits of paper, and they will fly up and cling to the rod. Imagine!"

His father smiled absently. Alfonso didn't even smile. Only his mother was sympathetic. "Now isn't that exciting?" she said absent-mindedly. "I wonder why the paper acts that way."

"Electricity," replied Guglielmo eagerly, then realized that his mother was not listening.

Sometimes the boy felt that no one understood him. His mother was a musician, his father a banker, and Alfonso was interested in business. Alfonso was quite grown up, with a

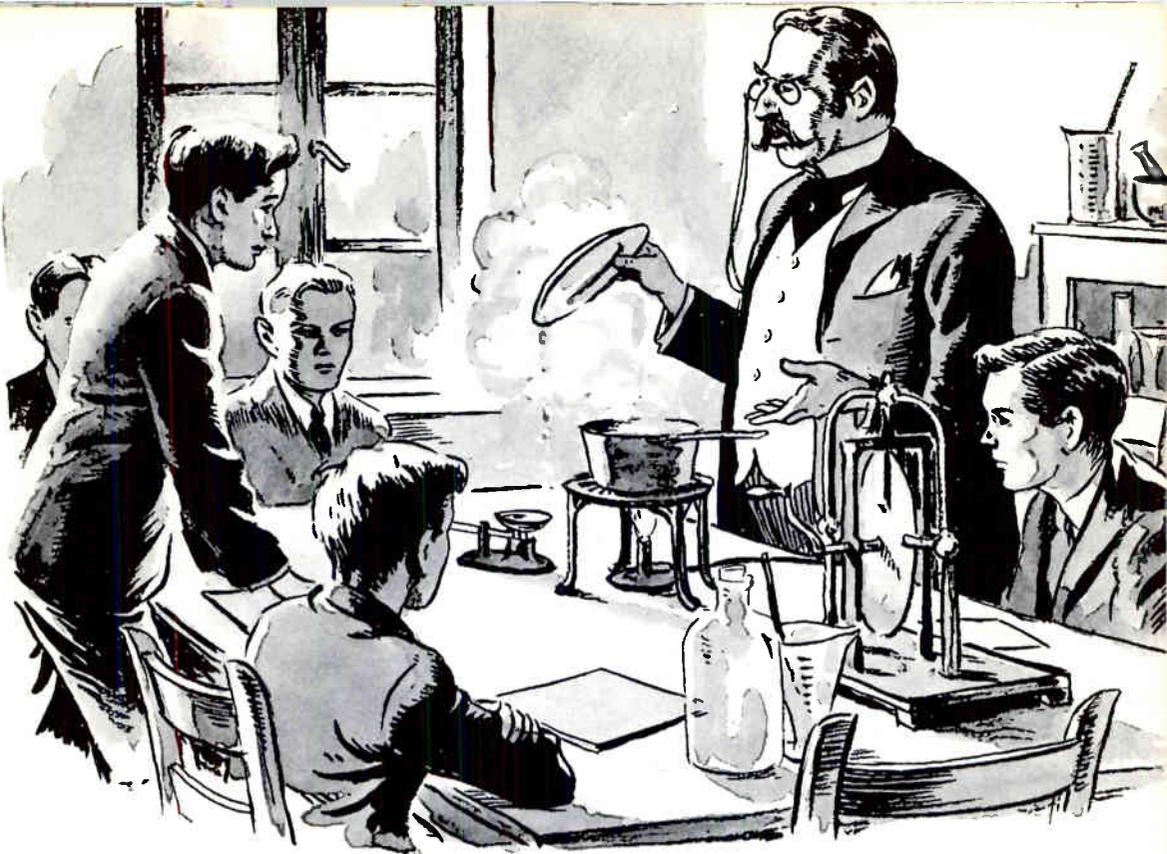
mustache as big as their father's. The two men often went off together to the nearby city of Bologna (*bo-lo' nyah*), while Guglielmo stayed at home with his mother, his tutor, and the servants.

In the village which sprawled in the valley below the Marconi mansion, there were other boys. They attended the village school and worked in the fields. Their paths and the path of Banker Marconi's son never crossed. Even Guglielmo's speech was different from theirs, because he spoke his native Italian with an English accent. His mother came from Dublin, Ireland, and she called Guglielmo "William." Whenever they were alone together, they spoke in English.

Guglielmo grew up shy of people but friendly with nature. He fished and rode horseback and climbed trees. On summer afternoons he liked to watch the drift of clouds above the hills. He watched them darken and pile up. He saw the trees shake wildly. He heard the heavens crash and saw them glare with lightning.

The Marconi family usually closed its house and spent the winter months in a warmer city, such as Florence or Leghorn. By the time Guglielmo was fourteen, he had outgrown his tutor, and it was decided to send him to a school in Florence. It seemed that he had entered a new world—a world of science.

His class in science met in a room furnished with a long table upon which stood a few bottles, some glass rods, a druggist's scales, and a strange machine with a handle that made electricity. Behind the table stood the professor, who talked about the secrets of nature, about clouds and sunlight and lightning. Those subjects were not new to Guglielmo. He had already read about them. What was new were the experiments that the professor performed.



Once the professor told the class that sunlight was made of many colors. "See for yourself," he said, and passed a glass prism around among the pupils. When Guglielmo's turn came to look through the prism, he beheld not white light but all the hues of the rainbow.

Another time the professor boiled some water in a kettle. When clouds of steam arose, he held a metal dish against the steam.

"Now watch the rain," he said. Instantly the dish was moistened with the steam, and then began to drip water.

"Now you see why it rains," said the professor. "Moisture rises from the surface of the earth, cools, and falls again as rain."

And lightning? Lightning was electricity, the professor said.

These experiments were exciting to Guglielmo. He wished there were someone at home who shared his love for science. When the family returned to Pontecchio, he suddenly realized that there was someone. In his own house he could enjoy the company of a world of people like himself. Why, he had met some of them before. They were the people in books in his father's library.

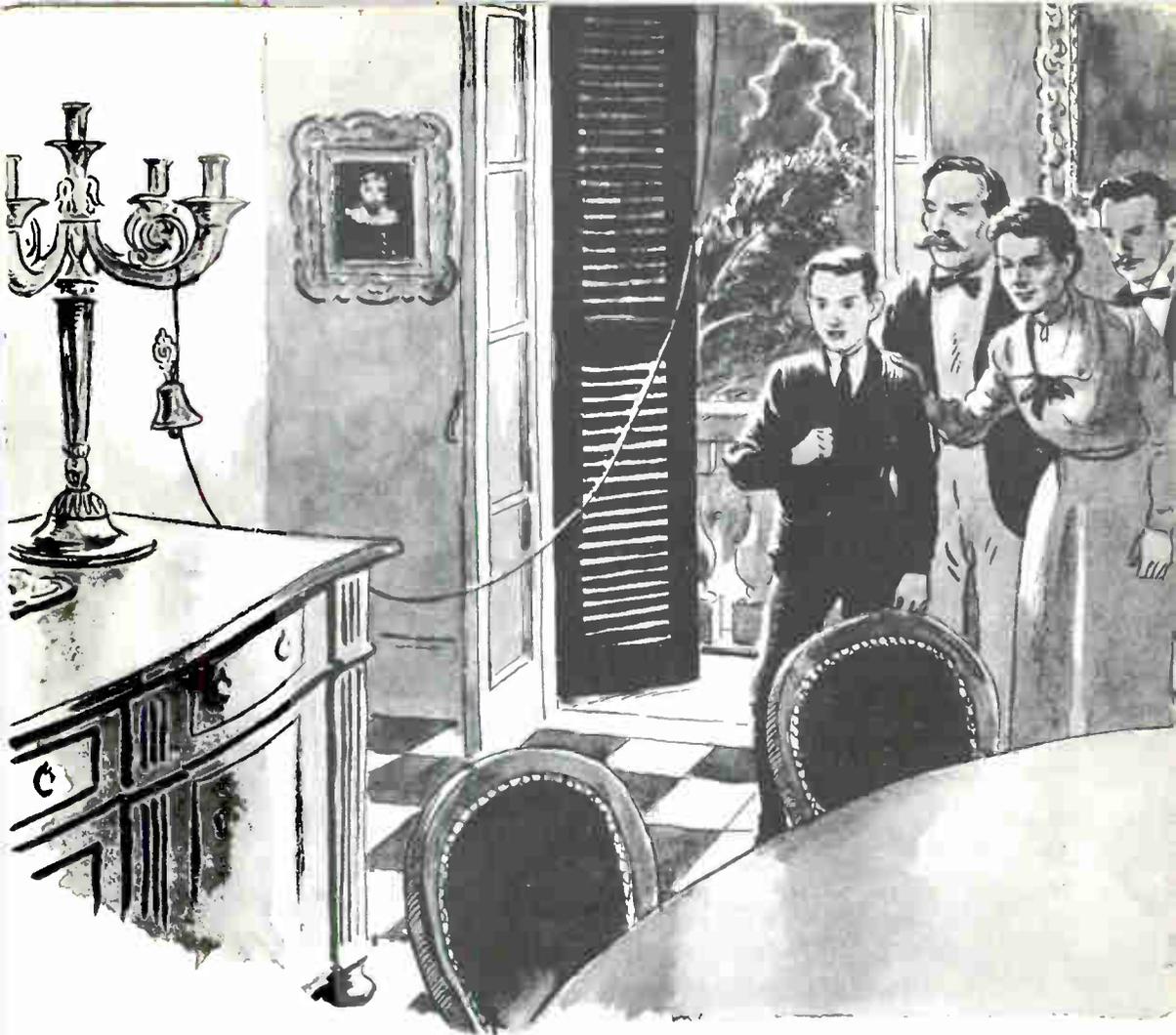
One day, in a book, he met an American whose name was Benjamin Franklin. More than one hundred years earlier, Franklin had discovered that lightning was electricity. He believed that electricity could be drawn from the clouds by means of a kite.

A strange idea flashed into Guglielmo's mind. He thought of the little bell in the dining room. Why couldn't a storm cloud ring it? Electricity could act like an invisible hand. The storm cloud would reach right into the dining room and shake the bell clapper.

"Won't the family just fall off their chairs!" thought Guglielmo gleefully.

The next day he found a piece of zinc and some wire, climbed upon the roof, and attached the zinc to the highest point. He ran the wire down alongside the wall and into the house, where he connected it to the bell clapper. Then he waited for the storm. The lovely sunny days made him impatient, but one day the clouds darkened above the distant hills. The trees shook wildly. The heavens crashed. And the bell in the dining room tinkled.

Guglielmo was excited, but his father only smiled. His mother said, "Isn't it jolly, darling?" Alfonso wondered why the fuss.



Guglielmo went back to his books.

He read about another American, Samuel Morse. Morse had taken a long wire and coiled the end of it around a bar of iron. When he sent electricity through the wire, an odd thing happened. The iron bar with coils became a magnet. The next step was to put a second bar of iron near the first. Then Morse sent electricity through the wire again. This time the first bar attracted the second bar. The result was a clicking noise. And in that way the telegraph came to be invented.

Samuel Morse had also developed a system of short and long clicks, called dots and dashes, which telegraph operators could use in sending messages. A short click, or dot, followed by a long one, or dash, stood for the letter A. The letter B was a long click followed by three short clicks. By means of the telegraph cable which lay on the ocean floor, it was possible to send a message even across the ocean.

The story fascinated Guglielmo. He admired Samuel Morse, inventor of the telegraph, and Alexander Graham Bell, inventor of the telephone. These two inventors had made it possible for people miles apart to keep in touch with one another.

To learn more about science, Guglielmo spent a great deal of time in the laboratory of Professor Augusto Righi (*ow-goos' to ree' ghee*). Righi encouraged the quiet youth. Guglielmo's eyes were large as if he were forever listening. His ears bent outward as though to catch the faintest click of sound.

The summer that he was twenty, Guglielmo was having a vacation in a village high in the Italian Alps. One evening he opened a magazine to a page that told about a German professor, Heinrich Hertz (*hairts*). Before his death a few months earlier, the professor had been working in his laboratory. He turned on a machine that made electricity. Suddenly he heard a crackling noise. It seemed to come from the other side of the room.

He stopped the machine; the noise stopped. Again he started the machine. This time he saw sparks flash from a coil of wire lying on a table in a corner of the room. Strange! There were no wires connecting the machine to the coil of wire. Through those incidents and further experiments, Professor Hertz had discovered that electricity radiates invisibly through space.

Marconi put down the magazine. Suppose that coil of wire were in the next room, he asked himself. Suppose it were a mile away. Would it still receive the electric signal? Could it be made to do so?

"If it could," he thought, "why, then we could send messages broadcast, far and wide. There would be no need for telegraph or telephone wires or cables."

A spark of an idea was lighted in young Marconi's mind.





The Invisible Waves

When Guglielmo came back from his holiday in the mountains, his father and mother noticed that he was even more quiet than usual. He seemed even more busy, too. They knew that he had set up a machine for making electricity in his workshop on the third floor. From this workshop came sounds of tapping and scraping.

"The boy is building something or other," his parents guessed.

From time to time Guglielmo passed through the house carrying bits of metal or coils of wire. At mealtimes he sat with a faraway look in his eye. If anyone spoke to him, he answered absent-mindedly. He seemed to be listening to other voices.

"When are you going to tell us about your secret doings upstairs?" demanded Alfonso.

"Now, Alfonso," said his mother, "we'll just have to wait until your brother is ready to tell us. Professor Righi says that William is on the trail of big game." She waited a moment. "Aren't you, William!"

"I don't know, Mother. Maybe I'm not a good hunter."

It was Guglielmo's way to be modest. At times he seemed really worried, as if things were not going well in his workshop upstairs.

One day his family heard a new kind of sound, an electric bell. That evening when Guglielmo came down to supper, he seemed cheerful.

"So the secret is out at last," said Alfonso. "You're making bells!"

Guglielmo smiled politely.

"Well, if it isn't bells, what is it?"

Guglielmo's smile faded. "I'm not sure. That's what I'm trying to find out."

Several days later Guglielmo brought a bell downstairs to the room where his family was sitting, and set it on a table. Then he went upstairs again. His mother and Alfonso watched. His father was busy with some documents. They heard Guglielmo's electric machine start. At the same time the bell on the table began to ring. Mr. Marconi looked up from his papers and stared at the bell.

"Nice trick," he said when Guglielmo came downstairs.

"How did you manage to do it?" asked Mrs. Marconi.

Guglielmo pointed to a small metal box attached to the bell. "That thing does it. It's a detector. It picks up invisible electric waves from the atmosphere."

His mother looked at him admiringly. She did not understand what an invisible electric wave was. But her son did, and that was satisfaction enough for her.

"But what is it good for?" demanded Alfonso. "Why go to so much trouble just to ring a bell?"

"It's not bells I'm thinking about," said Guglielmo.

"What then?" asked his father.

"There is a distance of thirty feet between this bell and the machine upstairs that makes the invisible waves. Suppose there were thirty miles in between. Suppose the distance between was three hundred or three thousand miles."

"You mean you want to be able to ring a bell three thousand miles away?"

Guglielmo shook his head. "No, in place of the bell, I would attach a Morse telegraph key and send messages."

"Without wires?"

"Exactly."

"How long would it take to send a message?"

"No time at all. Invisible waves travel with the speed of light."

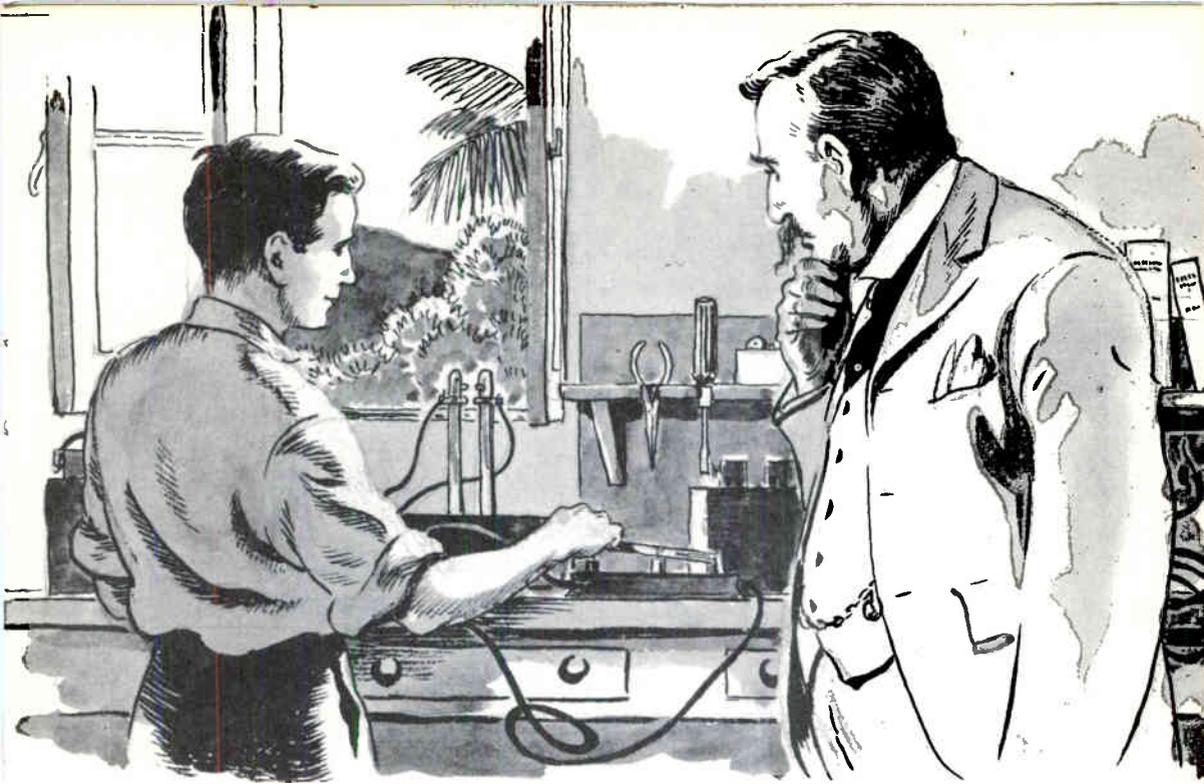
His father leaned forward. "An invention that could do that would be worth millions," he said. "But is the idea practical? Is it really possible to send messages any distance without wires?"

Again Guglielmo shook his head. "I don't know yet. Maybe I'll never know. Just now I'm sure only of sending waves thirty feet. Maybe the thing works only for short distances, say several miles. Maybe mountain ranges or bodies of water would stop the invisible waves. There are all kinds of problems, and it will take a great deal of work and patience to find the answers. It will take money, too, I'm afraid."

Mr. Marconi was a good father, but he was also a good businessman. "We'll see," he said cautiously.

A few days later Guglielmo attached his detector to a Morse telegraph receiver. He set them on a table in the garden. The family stood tensely around the table. Guglielmo went upstairs. From his window came a whirring noise. On the garden table the receiver clicked.

"What's the Morse signal for S?" called Mr. Marconi.



"Three dots," Guglielmo answered.

"Then let us hear it."

Click-click-click.

Mr. Marconi looked at the receiver in astonishment. He climbed up to the workshop to see for himself how Guglielmo had sent the signal. What he saw, however, was not easy to understand. The worktable was littered with small tools, coils of wire, and other objects of metal. More important than anything else in the room was a machine with two metal balls about an inch apart. Two batteries for supplying electricity were wired to the machine. Completing the circuit for the electric current was a telegraph sender, or transmitter. Guglielmo pressed the key of the transmitter. A heavy spark, like miniature lightning, leaped and crackled across the gap between the metal balls. At the same time, the receiver in the garden clicked.

"I still don't understand," said Mr. Marconi. "How can this electric spark reach the receiver out there?"

"It's like dropping a stone into a quiet pond," his son explained. "The stone disturbs the water, and rings of tiny waves spread out from the point where the stone was dropped. The spark in this machine sets electric waves moving through the atmosphere, and the waves spread out in all directions. Only we can't detect such waves with our eyes or ears. We need special instruments, like my little detector in the garden."

Mr. Marconi shrugged. "An interesting experiment. But after all, you have only sent your signal a distance of two hundred feet. I can shout and be heard for half a mile."

"Don't you understand, Father?" said Guglielmo excitedly. "These waves can travel to the ends of the earth in a flash. That is, they can do it if the transmitter is powerful enough and if the receiver is sensitive enough."

"Are you sure that you can make them powerful and sensitive enough?"

Guglielmo shook his head.

"Then it's a risk?"

"It's a risk."

Mr. Marconi smiled. "Will five thousand lire (*lee'ray*) help you to get started?" Five thousand lire were about a thousand dollars.

Guglielmo began to plan a harder test.

Alfonso, too, became enthusiastic. He helped Guglielmo attach a metal plate to the top of a long pole. The other end of the pole was to be stuck into the ground. The detector was fastened to the pole, and the receiver wired to it.

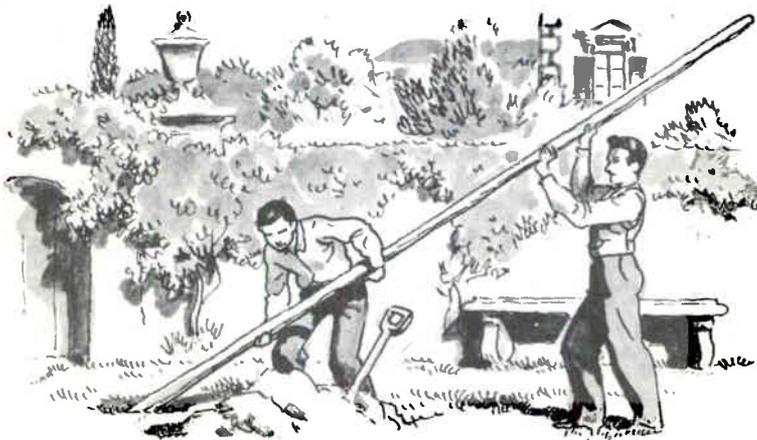
"The metal plate might make the signals stronger," Guglielmo explained.

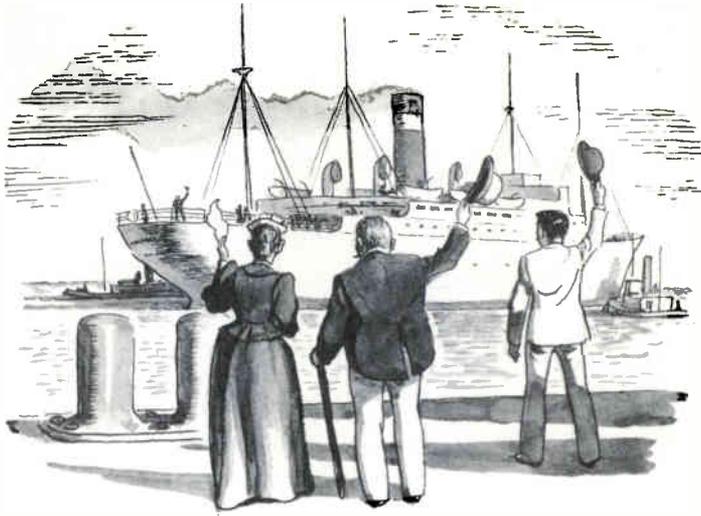
Alfonso did not understand all of the reasons back of the tinkering, but he began to feel a great respect for his younger brother. When Guglielmo said, "Ready," Alfonso climbed the hill about a mile from the house, carrying the receiving instruments and a white flag. A mile! Would it be possible to send the signals for such a long distance? Alfonso wondered as he set up the equipment.

Suddenly the instrument before him went click, click, click. Alfonso jumped up excitedly and waved the flag as a signal to Guglielmo that the experiment had succeeded. Guglielmo was going to be a great man. Alfonso had always known it!

Then came the day when Alfonso took the receiving equipment into the valley on the other side of the hill. This time he carried a gun in his pocket. He would fire it if this new, harder experiment proved successful.

After a while Guglielmo pressed the key of his transmitter. Two miles! Would the signal carry that distance? In an instant he heard the sound of a gun. Again and again Alfonso fired into the air. The shots were not only a signal of success to Guglielmo, but a celebration.





Marconi in England

Guglielmo Marconi was sure that he had invented a form of wireless telegraphy, but he still had to convince others that his invention would work.

To build stations cost great amounts of money. Where could he raise it? Not in Italy. "England, of course," said his mother. "Remember you have cousins there."

The spring when Marconi was twenty-two, he packed up his equipment and took ship for England.

In London one of his cousins introduced him to Sir William Preece, chief engineer of the Post Office. Sir William listened to Marconi. "I would like to see how this invention works," he said.

Upon the roof of the Post Office, Marconi set up a transmitter and a receiver. One hundred yards away on another roof, he set up another transmitter and receiver. Then he started to send the dots and dashes of the Morse code over the rooftops.

"Well," Sir William admitted, "it works at one hundred yards. But we'll have to do much better than that."

Sir William invited a number of government officials to witness the next test. It took place in the open country. First Marconi demonstrated his wireless at a hundred yards, and everybody nodded. Then at one thousand yards. A mile. Six miles. When he succeeded in sending a message over a space of nine miles, the spectators were amazed. They felt that they had seen magic.

Yet, how important was this new wireless invention? Telegraphy was already in use. It needed wires, to be sure. But why bother changing to wireless in order to send messages such a short distance?

"I believe that the distance can be much greater," insisted Marconi. "This is just a beginning. I need only time and money for experiment."

The officials wished him luck and left. Only Sir William Preece was convinced that Marconi had invented a new way of communication. He assured his young Italian friend that he would do all he could to stir up interest in wireless. Marconi's task was to make his invention more practical. Sir William had such confidence in Marconi that he assigned one of the government engineers to assist him.

"What we have to show people," they agreed, "is that wireless can do what the ordinary telegraph cannot do."

Marconi thought, "The ordinary telegraph is useless on board ships. Let us see whether wireless works at sea."

By rail he journeyed to the southwest coast of England. On a cliff sixty feet above the sea he set up his receiver and erected a ninety-foot pole. On top he set a zinc aerial. His ground wire dangled down the side of the cliff to the

water's edge. The transmitter he set up on an island three and a half miles from shore.

On a windy spring morning, two of his men rowed out to the island. Marconi himself stayed in a shed by the receiver. He waited until the two men had time enough to reach the island. Then he hoisted a flag as a signal to begin the test.

He waited, but the receiver was silent. He checked all parts of the instrument. Everything was in good order. Had something happened to the men? He rowed out to the island. The men were sending the signals, as agreed, and the transmitter was in good order. Was wireless no good at sea? The night passed without sleep for Marconi.

The following day recorded the same failure. Some of the people watching shook their heads in doubt. The signals were sent, but none of them came through on the receiver. First one remedy, then another was tried. Nothing helped. The instrument was dead.

On the third morning, a stiff gale was blowing. One of the men from the island returned to make a suggestion. If the receiver were at sea level, the aerial would then be not ninety but one hundred fifty feet higher. Perhaps the extra height would help. It was one more thing to try.

The receiver was carried down to the shore where the surf pounded against the cliff. Again Marconi hoisted the flag. Immediately the receiver began to click and chatter, more alive than ever.

"This wireless machine — why, it really works," a spectator admitted. "A higher aerial was what it needed."

Italy, which at first had not been interested in Marconi's invention, then invited him to use a naval arsenal on the

west coast. Marconi was glad of the opportunity to test further the use of wireless at sea and on a moving boat.

With every new experiment Marconi gained more control over the invisible waves. All the while he was being observed by scientists, military officials, and businessmen. Once a little old man with a walrus mustache, accompanied by a sweet gray-haired woman, watched him demonstrate the magic of wireless. They were the king and queen of Italy.

A year and a half had passed since the day Marconi left Pontecchio for London. Many nights he could not sleep because of doubts and worries. Then came happier days. Sir



William Preece convinced enough businessmen that at last wireless was ready for service, and they organized a company. Marconi was given a large amount of money, besides a half share in the business.

People began to read about wireless in their newspapers. "What, no wires!" they said. "How can the empty air talk? Who is this wizard, Guglielmo Marconi, who says he can do such a thing?"

Marconi did not look like a storybook wizard. Those who met him were struck first by his youth. "Why, a mere boy!" they exclaimed. "Only twenty-three years old."

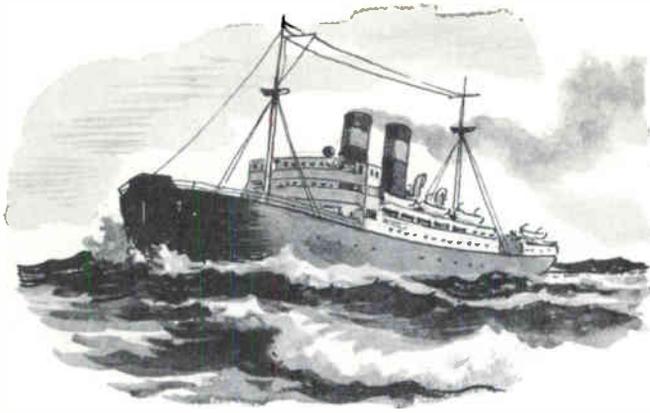
He had beautiful manners, they reported. They also mentioned his shy, serious eyes. He was slim and somewhat taller than average. He wore nice clothes, and his hair was neatly brushed.

The more learned men said, "Yes, wireless is possible for a short space, but not over long distances. After all, we live on a globe. The curve of the earth's surface will affect wireless. Those waves will not turn."

Others asked, "Of what practical use is wireless?"

In the year 1897, no one yet knew the answer to that question.





Spark across the Sea

Of one thing Marconi was certain. Wireless could be useful to ships at sea. A permanent station was needed to conduct experiments, and in November, 1897, the first station was set up. It was located in a hotel at Needles on the Isle of Wight. Marconi had put up a tall mast against the hotel building for an aerial. He had run wire from the aerial into the window of a room which the Marconi company had rented.

There sat two young men operating the instrument. One of them pressed the long handle of a key. A bluish spark leaped across the gap between two metal balls.

Wireless seemed to be a simple operation. The miracle was that a ship, if it had a Marconi instrument, could receive a message several miles out at sea. And a ship with a wireless transmitter could send messages to telegraph operators on other ships and to stations on land.

Visitors to Needles sometimes asked, "Does the curve of the earth affect your invisible waves?"

"I don't believe so," replied Marconi.

"Do hills stop them?"

"No."

"Weather?"

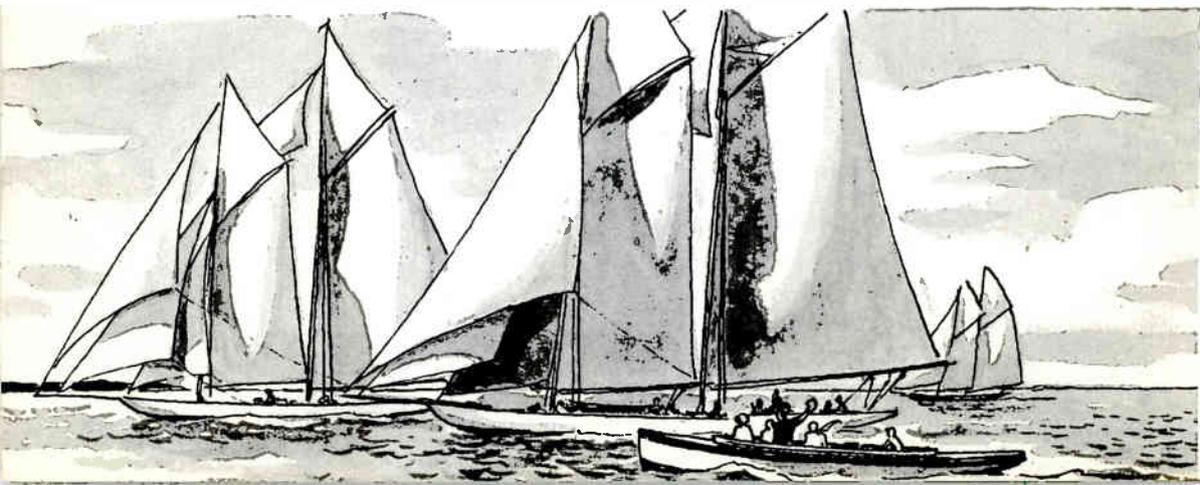
"No."

Many visitors asked, "Will they ever be able to reach America?" And Marconi always answered, "Why not? Give us time."

Then the editor of the *Daily Express*, a newspaper of Dublin, Ireland, had a brilliant idea. A yacht race was to take place off Kingstown, five miles south of Dublin. The editor asked Marconi to report the event by means of his wireless.

On the day of the race, crowds of people gathered outside the windows of the *Daily Express*. On shore at Kingstown, Marconi set up a receiver. He himself followed the yachts in a boat, the *Flying Huntress*, on which he had set up a transmitter. He reported the progress of the race in Morse code. As soon as his messages clicked at Kingstown, they were telephoned to the offices of the *Daily Express*. Before the yachts came back to the harbor, the newspapers were on the streets with the story of the race.

A short time after the race, Marconi received a request from Queen Victoria. She was staying on the Isle of Wight. On a yacht anchored off the north coast, her son Edward, the Prince of Wales, was ill. He had hurt his knee, and the queen, like any mother, was anxious about his condition. Marconi was consulted. Stations were set up at the queen's

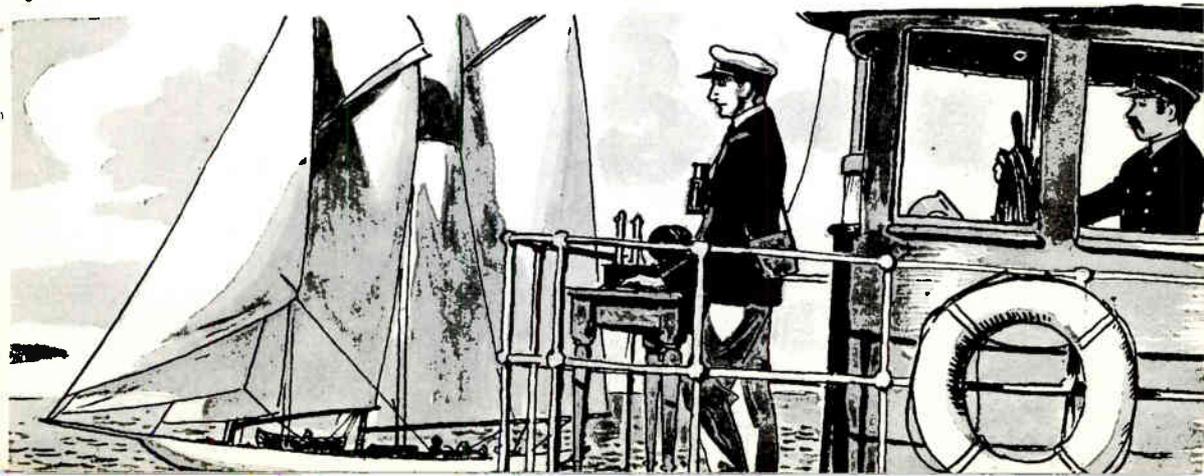


house and on the prince's yacht, and messages soon began to click between the two places.

"The Prince of Wales sends his love to the queen," Victoria read. Later her son reported that he had passed a good night and that his knee was in good condition.

The invisible waves continued to flash news of fun and business to the people of England. But they soon realized that wireless was to have a more important use. A storm tore away the bulwarks of a ship tossing in the channel. Fortunately it was furnished with a wireless transmitter, and the ship flashed a distress signal. Rescue boats arrived in time to save every person on board. Shortly after that experience a steamer and a lightship crashed together in a fog. Again everyone was saved, thanks to wireless.

Marconi often looked eastward across the channel toward France. He wished that the French government would let him try to establish communication by wireless between England and Europe. Permission was granted at last in March, 1899. For his station in France, Marconi chose a place on the coast called Wimereux (*veem-ruh'*). On the opposite side of the channel, another station had been made ready in a village on the cliffs of Dover. The distance between the two stations was thirty-two miles.



The people of Wimereux wondered why, on that cold March day, the foreign tourists were putting up a pole one hundred fifty feet high. They wondered why some of their own officials stood watching. The officials wondered why Guglielmo Marconi, the famous inventor, was helping with his own hands to rig up the equipment. And Marconi may have been wondering if wireless would pass this next great test.

The big moment came at five o'clock in the afternoon. Marconi sat down at the transmitter. Nearby was his receiver. Around him crowded the officials, engineers, and newspaper reporters. Outside the cottage there were sea and sky and boundless space. Marconi put his finger on the long black handle of the key. The savage blue flame spoke.

Bripp . . . bripp . . . bripp. The sounds meant: "V (I'm calling)."

Marconi waited a second, his finger poised over the key. Then his receiver clicked: "M (Your message is perfect)."

This success meant that England and the continent of Europe could communicate by wireless.

Later an American reporter visited the cottage to look over Marconi's invention. Was it as remarkable as some people seemed to think? Or was Marconi trying to fool the public? The reporter had a way of finding out.

"Would you send this message?" He handed a slip of paper to one of Marconi's engineers. His message was addressed to another reporter in care of the Marconi Station on the English side of the channel. It read:

"GNITEERG MORF ECNARF OT DNALGNE HGUORHT EHT REHTE."

The spark flashed its dots and dashes. A few moments later the answer clicked:

“YOUR MESSAGE RECEIVED. IT READS ALL RIGHT. VIVE MARCONI.”

By sending each word of the first message backwards, the reporters proved to themselves that Marconi's exhibition of wireless was not a mere trick.

“Suppose a number of stations are broadcasting at the same time,” inquired the American. “What happens then if you start your receiver going? Won't you get a jumble of words?”

“Yes,” Marconi admitted. “I am concerned about that. I believe, however, that I can remedy the trouble.”

“How?”

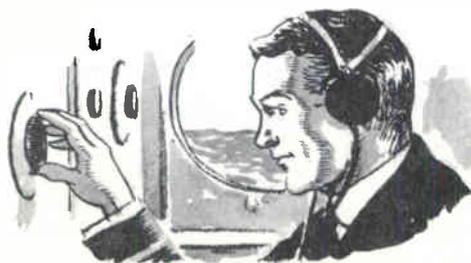
“By a tuning device.”

“What's that?”

“Something by which you can select the station with which you want to communicate.”

The reporter blinked. Marconi might be a genius, but invisible waves couldn't be made to act like trained fleas. The idea was more than a man of common sense could swallow.

Marconi smiled. “If we change the size of the spark and a few other things, we change the size of the waves. Our present wave length is, I judge, about two hundred feet, but we can produce shorter or longer waves. I believe that we can arrange the receiving set so that it would be attuned to whatever wave length we choose. In this way we shall be able to shut out messages we do not want. The tuning device would act just like a lock and key.



“Don’t be surprised,” Marconi went on gently. “Wireless is a baby yet. When it grows up a bit, it will do amazing things. It may even carry news into every house, not once a day like newspapers, but every hour.”

The reporter wrote down everything that was said. He considered the young Italian a dreamer, but Marconi’s predictions of miracles would entertain American readers.

Other scientists besides Marconi were then at work on ideas for a tuning device. About a year later, in 1900, Marconi made the dream of a tuner come true. He showed how it worked, in a demonstration between the Isle of Wight and the town of Poole in England. He gave two messages to two operators in the station on the Isle of Wight. One message was in English, the other in French. They were sent at exactly the same time. In Poole two receivers, hooked up to the same aerial, clicked off the messages at exactly the same time.

A new and marvelous period in the world’s history had begun. People hundreds of miles apart could exchange thoughts in an instant. The fame of the young Italian spread around the world. He had worked hard. He had succeeded as few men ever had. At twenty-six, he was not only famous but rich.

He loved his native Italy and could have retired there to a long life of peace and sunshine. He could have indeed, except for a job not yet finished. His invisible waves had crossed the English channel. But not until they had crossed the Atlantic Ocean would he consider his invention a success. All of his efforts must be directed toward making that next important test.

The spark that could drive invisible waves across an ocean would have to rival the savage lightning in size. The instru-

ments Marconi had developed were toys compared to the instruments he would have to build. For more than two years, this project kept Guglielmo Marconi restlessly at work.

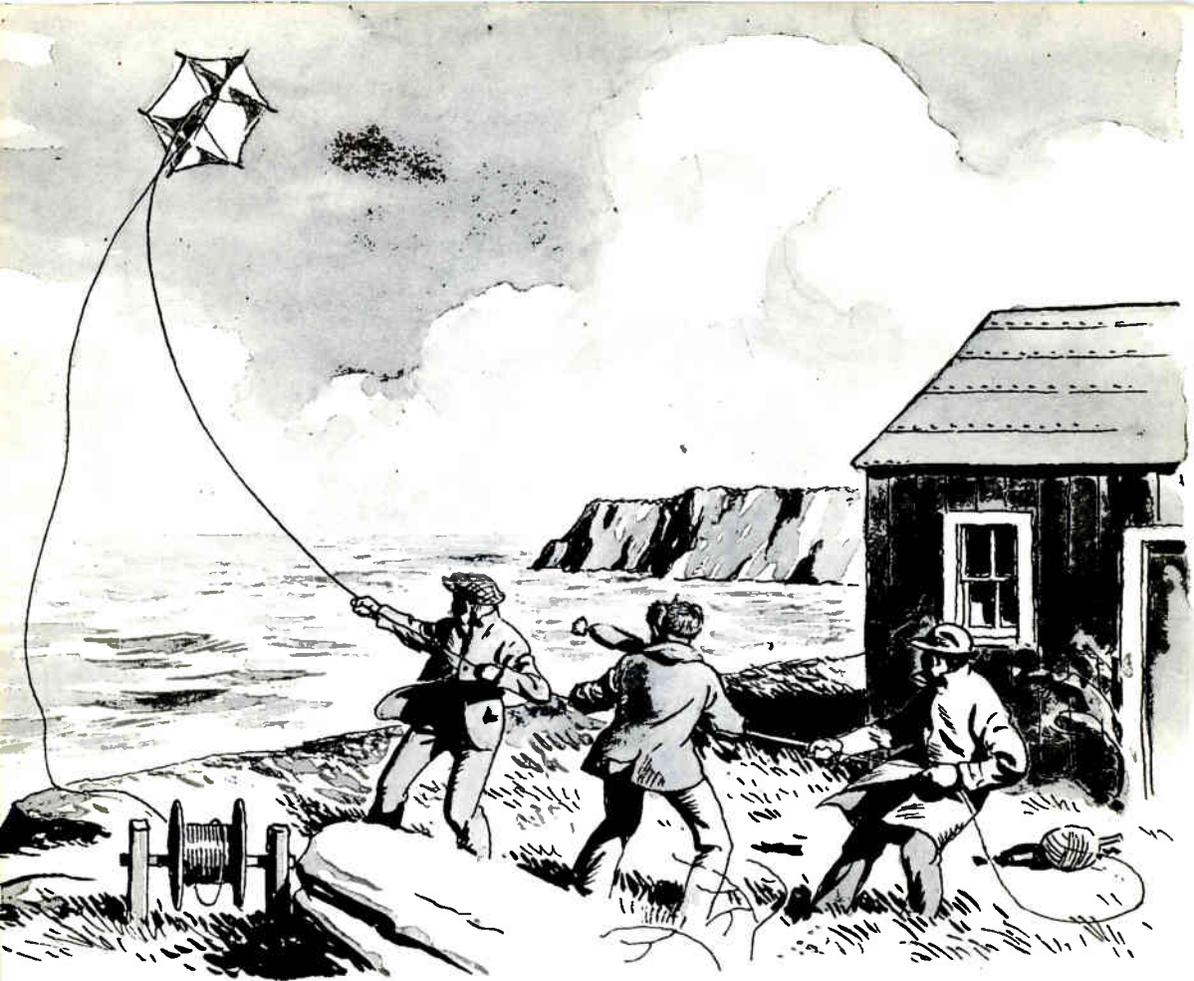
For his sending station he chose a place called Poldhu (*poal-dew'*) on the southwestern tip of England. Few people lived there. Strong winds swept across the rocky coast and wild moors. The winds seemed to defy Marconi and his engineers when they tried to erect an aerial. Twenty tall wooden masts, or posts, were placed firmly in the earth. The ring of masts towered two hundred feet above the cliff.

"That's done," thought Marconi with satisfaction, when suddenly the wind howled from the sea, and the masts went down like so many match sticks.

The work of erecting twenty masts had taken nearly a year. A better, more sturdy aerial must be built.

On the American shore the point closest to Poldhu is on the coast of Newfoundland. On November 26, 1901, Marconi, accompanied by two assistants, George Kemp and Phil Paget, sailed from Liverpool. They arrived in the harbor of St. John's eleven days later. They made their way up a hill overlooking the harbor. At the top they came to an old barracks which the governor of Newfoundland had provided for them. Paget started a fire in a pot-bellied stove. They unpacked their kites and balloons and the rest of their equipment. Their plan was to send up a kite or a balloon to act as an aerial.

The temperature dropped. The ground froze, and the wind became a gale. The men's fingers were stiff with cold as they began their work outdoors. They had arranged with the operators at Poldhu to begin their experiment on the eleventh of December. Every day from noon until three o'clock, Poldhu was to flash the letter S (three dots).



On the morning of the eleventh, Marconi and his assistants attached about six hundred feet of wire to a large balloon. The balloon, which was filled with hydrogen, soared upward. The wind howled and ripped it free of the wire. The wire fell, dashing the men's hopes, while the balloon sailed away. The atmosphere around them might be pulsing with signals, but they could not prove it, at least not that day.

Next morning the men brought out a kite. The wind whipped it aloft. It bucked and tugged, but the combined strength of the three men managed to hold it captive.

Finally it grew tamer and the wire was fastened to a pole outside the barracks.

At noon the men went inside. Marconi sat down at the instrument to which he had rigged a telephone receiver. The great moment had come. He put the receiver to his ear. Kemp and Paget watched silently. They heard the thunder of the sea against the cliff. They saw the kite twisting about in the air. Across the harbor the city of St. John's lay shrouded in a fog. Marconi was listening. After a while he smiled.

"Can you hear anything?" he asked, handing the receiver to Kemp.

Kemp put it to his ear. At first he heard a confused rush of noise. Then, yes, he heard what Marconi had heard. He heard three sharp clicks. He heard Poldhu across two thousand miles of ocean.





The Spark Many Years Later

Few people in 1901 realized how much their world was changing. To them Marconi's spark across the ocean was a great stunt, like swimming the English Channel or climbing Mt. Everest. No one knew that the use of invisible waves would transform their daily lives during the next fifty years. Men of science, however, realized that Marconi's achievement was remarkable.

Before the inventor left American shores, three hundred members of the American Institute of Electrical Engineers gathered to celebrate. Some of the most famous scientists in the country were present. Alexander Graham Bell with his snow-white beard sat alongside the boyish guest of honor. At one end of the hall the word "Poldhu" was spelled out in electric lights; at the opposite end the word "St. John's." Between them tiny lamps were strung in groups of three along the wall, repeating the Morse signal for S.

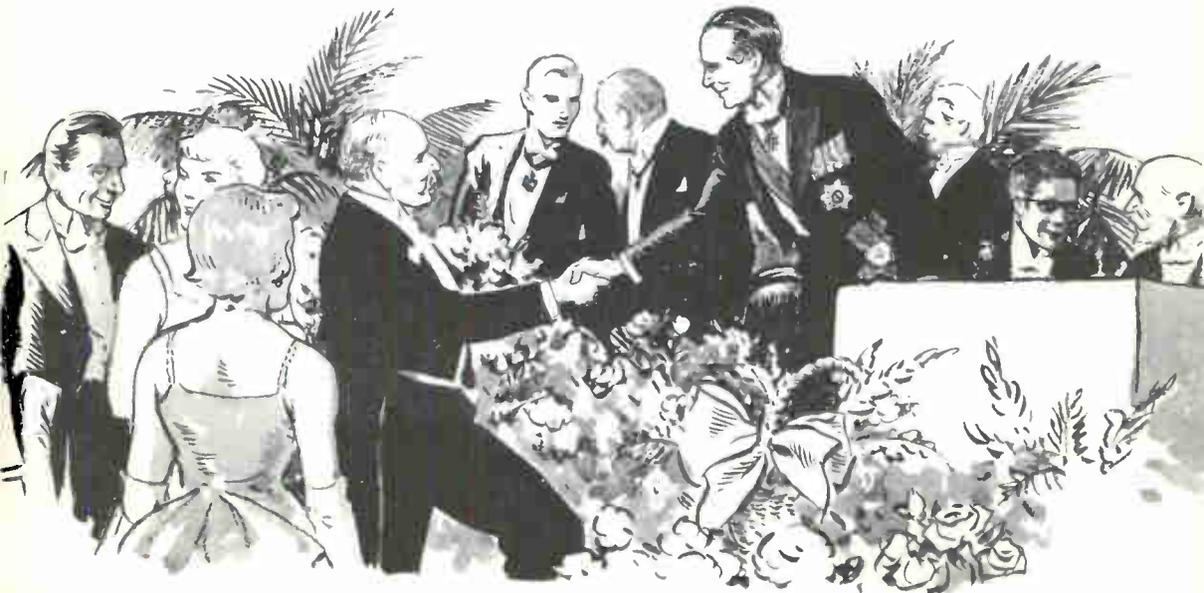
The toastmaster read a letter from Thomas Alva Edison, who regretted not being present. "I'd like to meet the young

man who had the audacity to jump an electric wave across the Atlantic," Edison wrote.

Much honor was paid to Marconi that evening. When he arose to express his thanks, he said humbly that he owed his success to the work that many scientists had done before him. He mentioned, among others, Heinrich Hertz, who had discovered the invisible waves; and Alexander Graham Bell, inventor of the telephone.

From that evening to the end of his life Guglielmo Marconi was to be given honors by every nation in the world. Scientific prizes would be awarded him. Great universities would confer degrees upon him. Kings and governments would seek his services. But no tribute would ever move Marconi so much as the welcome home that he received when he returned to Italy.

His neighbors and fellow-citizens crowded into a big gymnasium. There they sat, excited and cheering. Marconi's mother and father beamed with pride. His old teacher Professor Righi made a speech in his honor. When Marconi arose, his



hand shook. It was hard to find the right words to express his gratitude.

Honors were pleasing. But more important to Marconi was the fact that his invention could save lives at sea. In the early days of wireless, few ships were equipped with a set. Some shipowners were reluctant to spend the money to hire an operator. Marconi kept saying, "Every ship should be required by law to install wireless." Little by little the shipowners were convinced.

Many times wireless saved the lives of passengers and crews on ships provided with sets. For instance, one night in 1909, the S.S. *Republic* and the S.S. *Florida* crashed together in a fog. Passengers were thrown out of their bunks. The lives of more than sixteen hundred people were in peril. The *Republic* was sinking steadily.

Fortunately it was equipped with wireless, and its distress signal was picked up by three ships, one English, one American, and one French. The rescue ships arrived in time to save every person on board.

Although Marconi was famous and wealthy, he worked harder than ever. His discovery had to be developed. The next big task was to set up his equipment in distant parts of the world. In this work he was assisted by the engineers of the Marconi Wireless Telegraph Company.

An even bigger task was to find ways to make the electrical waves more useful. He had used the waves to carry a signal. Was it possible to make them carry voices? Many scientists joined him in searching for an answer to that question.

"A day is approaching," Marconi predicted, "when a person will be able to pick up a telephone in New York and say to the operator, 'Get me London, please.'"

By 1920 wireless was beginning to be called radio in some countries, because its waves radiated in all directions. In that year the presidential-election returns in the United States were broadcast by voice. A year later the first prize fight was broadcast. In 1924, Marconi himself spoke from Poldhu to Sydney, Australia.

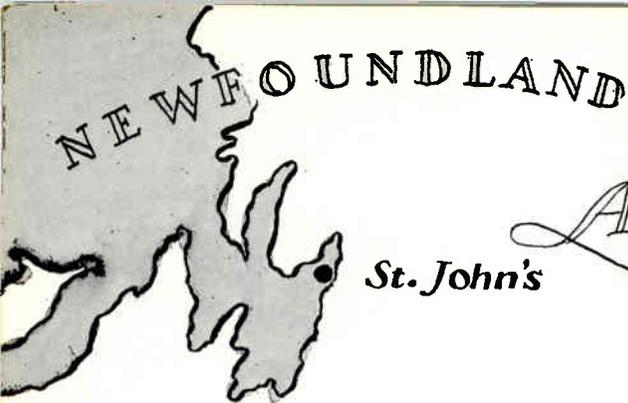
Then the wireless waves were made to carry pictures. In 1928 the face of a woman flickered across the sea from London to New York. Later that year the picture of President Hoover, as he was speaking in Washington, was flashed on a screen in New York.

In December, 1931, the world celebrated the thirtieth anniversary of the first transatlantic signal by wireless. The master of ceremonies stood at a microphone in New York City. Marconi sat before a microphone in London. Other speakers stood at their microphones ready to salute him: one in Paris, another in Rio de Janeiro; one in Rome, another in Honolulu; one in Caracas, another in Montreal; one in Tokyo, another in Buenos Aires; one in Brussels, another in Ottawa; one in Washington, another in Berlin.

From time to time the master of ceremonies said, "Go ahead, Rio," or "Go ahead, Paris," as if he were speaking to someone in the same room. Marconi had squeezed time and distance into that room. One after another the speakers told what wireless meant to their nations and of the debt owed to its inventor.

Then "Go ahead, Mr. Marconi," said the master of ceremonies.

"My thoughts go back to a moment thirty years ago," said Marconi. "Instead of sitting in a comfortable room in London, sending signals which I know will be received and understood



St. John's

ATLANTIC OCEAN

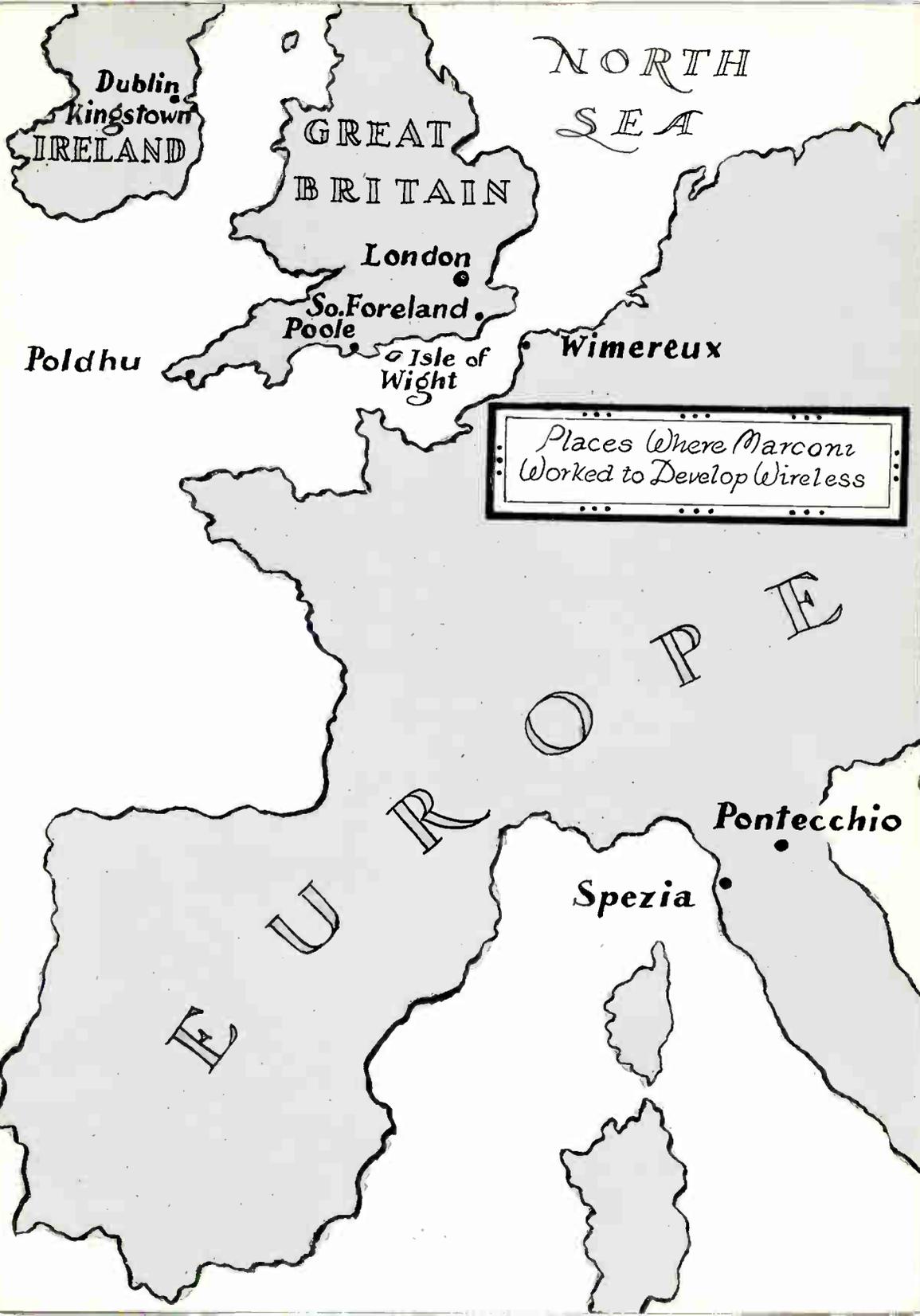
on the other side of the Atlantic, I was standing in a bitter cold room on the top of a hill in Newfoundland. I was wondering if I should be able to hear the simple letter S transmitted from England. I am happy that Mr. Kemp and Mr. Paget, who were with me at Newfoundland, are at my side again at this moment."

In 1933 the Century of Progress Exposition, held in Chicago, had set aside a Marconi Day. In one corner of the large Science Building was an exhibition of amateur radio equipment. The boys who had built the sets stood by proudly, ready to display them to visitors. A man came along and stopped.

"That certainly is a fine piece of work," he said, pointing to a transmitter.

The boy who had built it began to explain what he had done. Suddenly something clicked in his mind: the picture of a famous man tacked up over his bureau at home. The boy blinked. The man who stood before him was older than the man in the picture. But there was the same high forehead,

AZORES



NORTH
SEA

Dublin
Kingstown
IRELAND

GREAT
BRITAIN

London

So. Foreland
Poole

Isle of
Wight

Poldhu

Wimereux

Places Where Marconi
Worked to Develop Wireless

E
U
R
O
P
E

Pontecchio

Spezia

E

U

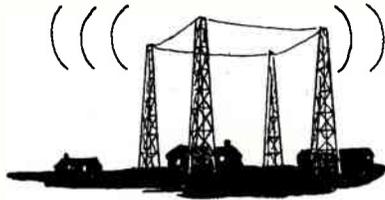
R

the same shy, serious eyes and the ears bent outward to catch the faintest click of sound. The boy's knees quaked a bit.

"It isn't very good, I guess," he stammered. "I'm only an amateur."

Guglielmo Marconi smiled encouragement. Sometimes he felt that he was just beginning to understand wireless himself. No one knew better than he did that the possibilities of wireless had been only slightly tapped.

"I'm only an amateur myself," he said.



The quotations set off by boldface quotation marks (“”) are the words used by historical characters in recorded conversations, letters, or documents. Sometimes a quotation has been shortened or adapted to the vocabulary of young readers, but the substance of it has been given, and the meaning and style of the original have been carefully preserved.

In a few places the author has told what the characters might have said under known circumstances in order to make the biography more vivid. Such imagined conversation is indicated by regular quotation marks (“”).